the most part. Four volumes will thus be added to this remarkable work, making in all twenty-six, with 2000 plates of illustrations.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

THE Bristol Merchant Venturers' School of Science, Technology, and Commerce, erected at a cost of nearly 50,000*l.*, to replace the old Trade and Mining School, was formally dedicated by the merchants to the city on Saturday, when their handsome gift, including the complete charge of the school, estimated at 1000*l.* a year, was received by the Mayor on behalf of the citizens. After the Trade and Mining School was handed over to the Colston Trust by the Endowed Schools Commissioners, this science school, which had already won a very distinguished position in the country, made such rapid progress that the building was soon found inadequate for the 500 scholars attending it, and the Merchant Venturers, who constituted the chief part of the governing body known as the Colston Trust, determined to build a new school on the plan of the newest and best equipped English and foreign school, with the best-known methods and appliances for science and art instruction. Finding that the Colston Trust funds assigned for the purpose were inadequate to the demand of such a large building, they undertook the entire charge, so that the scholastic institution will henceforth be known as the Bristol Merchant Venturers' School. Sir Frederick Bramwell, C.E., Chairman of the Council of the City Guilds Institution for the Advancement of Technical Education, the Mayor and High Sheriff of Bristol, the Bishop of Gloucester and Bristol, Mr. Samuel Morley, M.P., Mr. Lewis Fry, M.P., Col. Donnelly, Capt. Abney, and others took part in the inaugural ceremony, which was prefaced by a luncheon given by the master of the Society, Mr. R. W. Butterworth, at the Merchant Venturers' Hall. After the luncheon the party repaired to the new schools, and the opening ceremony took place in the examination hall. The Master (Mr. Butterworth) presided, and in opening the proceedings gave a history of the growth of the old Trade School and its development into the present great establishment. The Master then called upon Sir Frederick Bramwell to declare the building open. Sir Frederick Bramwell said he thought that he might safely say that almost by universal agreement the training to be given in schools such as that was held to be a training that ought to be given, and was a national benefit and blessing. That meeting, he said, was not to initiate something new, for, as had been said, the work had gone on for thirty years; it was not to mark a birth, but to mark progress; not the full development, or anything like it, but a stage—for they would hope that not many years would elapse before an audience as numerous and as earnest as that he saw before him would meet in Bristol to celebrate some further marked step in the development of technical education in the city. What was the object in giving this technical education? The primary object was to enable men and women to earn their living better than they could otherwise do. The primary object of such education was to teach men engaged in industrial pursuits to conduct them in a manner which would redound to their happiness and material prosperity, and this would redound to the prosperity and welfare of the whole nation. A man instructed as he would be there would be enabled to carry on his industry in a totally different manner from those who had to begin the battle of life fifty years ago. At that time they had to profit by what could be taught them derived from experience, but without understanding the principle on which the things depended. They should remember the great things which for the first sixty years of this century were done by men who had not the advantage of technical education. But when a man had that advantage he was enabled to look at the experience of the past in a totally different manner, because he knew the principles on which that experience was based, and knew when it was applicable or inapplicable. Whatever his determination, the Englishman was badly weighted in his struggle with his foreign competitor if the latter had the means of applying science to his industry when the former had not. In London they were doing good work of this sort, one of the branches being technological examination, and during the past three years the number of those that came up more than doubled—from 1900 to 3900. That increase did not arise from the governing body relaxing the examination; on the contrary, they thought it right to add to he stringency of the examination. So the best judges of all, the very men whom they wished to instruct, themselves proved that they valued this instruction. It could not be said that this was a question where they were endeavouring to force on an unwilling people the advantages of education the value of which they did not recognise; and thus they had the encouragement arising from appreciation of their efforts.

MR. ARTHUR SMITHELLS, B.Sc. (London), assistant lecturer and demonstrator in chemistry at the Owens College, Manchester, has been elected to the Professorship of Chemistry at the Yorkshire College, Leeds, rendered vacant by the appointment of Dr. Thorpe to the Chair of Chemistry in the Royal School of Mines and Normal School of Science, South Kensington.

SCIENTIFIC SERIALS

Journal of Franklin Institute, No. 713, May.—Prof. C. F. Himes, actinism. A lecture delivered at the Philadelphia Electrical Exhibition, giving a succinct account of modern investigations.—F. E. Ives, isochromatic photography. Describes his blue-myrtle chlorophyll process.—C. J. Hexamer, fire hazards in textile mills. Deals with relative risks of cotton, wool, and shoddy of various qualities.—W. B. Le Van, economy in the use of high-pressure steam. Describes a new high-pressure boiler.—Prof. Pliny E. Chase, further experiments in weather forecast. Of interest to meteorologists.—Prof. E. J. Houston, glimpses of the International Electrical Exhibition, No. 7, Drawbaugh's telephonic inventions. Description and drawings of the instruments of this notorious person.

No. 714, June.—Dr. Persifor Frazer, the World's Industrial and Cotton Centennial exposition. Gossip about the New Orleans Exhibition.—Prof. J. Burkitt Webb, a simple form of draught gauge; a simple instrument for measuring the decrease of pressure in a flue directly by scales.—Dr. Werner Siemens, on the electromotive action of illuminated selenium, discovered by Mr. Fritts. In this communication, which is translated from the German, Dr. Siemens describes as being entirely new and scientifically of the most far-reaching importance, the phenomena discovered by Mr. Fritts, which were, at Philadelphia, condemned by Prof. Rowland as unworthy of being brought before the Physics section of the American Association. Dr. Siemens agrees with Mr. Fritts that in his experiments there is a direct conversion of the energy of light into electrical energy.—E. L. Corthell, the Tehuantepec Ship Railway.—Prof. E. J. Houston, facsimile telegraphy.—Appended to this number are the reports of the examiners of the Philadelphia Electrical Exhibition on electric arc lamps, and on carbons for arc lamps.

Annalen der Physik und Chemie, xxiv. No. 4, April.—Prof. F. Melde, experimental researches in acoustics. Gives account of new experiments with a phonic wheel and other electromagnetic means of exciting vibrations.—G. Tammann, on the vapour-pressure of salt solutions. Gives many hundreds of determinations of lowering of pressure of aqueous vapour by addition of some soluble salt. The author concludes that for a given salt the product of the relative pressure-reduction into the volume of the solution relatively to that of the water it contains is a constant. Exceptions are attributed to polymerisation.—Prof. W. von Bezold, on current-figures in liquids. The method consists in observing the forms which result from putting aniline dyes (such as are used for ink in hectograph) upon the liquids. The present paper deals with the internal currents set up by differences of temperature produced by surrounding with a ring of ice, &c. The figures are curious and instructive.—Prof. E. Kittler, on measurement of strength of currents. Describes the method of taking strength of currents by measuring potential when the current is passed through a known resistance.—Prof. G. Quincke, electrical researches, No. xi. This series deals with the constants of electromagnetic rotation. For sodium light, Quincke finds the constant for bisulphide of carbon to be 4·409′ at 21° C. Becquerel found 4·630′ at 0°, and Lord Rayleigh and Mrs. Sidgwick found 4·2002′ at 18°. Quincke gives tables of statistical results for other liquids, agreeing in the main with those of Perkin and of Becquerel.—A. Gockel, on the relation of the Peltier-heat to the efficiency of galvanic elements. A discussion of the work of Braun, Chaperon, Czapsky, Bouty, and others, with redeterminations.—W. Herman Schultze, on the reaction between two mutually perpendicular magnetic distributions. Very careful experiments confirm Siemens's result that longitudinal magnetism

diminished by a transverse magnetisation.—A. König and Fr. Richarz, a new method of determining the constant of gravitation.—Leo Arons, interference fringes in the spectrum. Fringes are observed to intrude; which the author eventually traces to the films between the two lenses of the achromatic telescopes.—Robert Weber, the electrical siren. An interesting apparatus producing tones in a receiving telephone by interrupting the circuit by a rotating cylinder having series of electric contacts around its periphery.

xxv. May.—Prof. L. Lorenz, determination of the electric resistance of mercury columns in absolute electro-magnetic measure. The result of the author's method is that the true value of the ohm is represented by a mercury column of 1 square millimetre section and 105·93 centimetres in length.—Franz Stenger, contributions to the electric conductivity of gases.—Hans Jahn, on the validity of Joule's law for electrolytes. The careful experiments establish the validity to a very close degree.—R. Lamprecht, on flexible conductors under magnetic influence. A mathematical discussion.—J. J. Balmer, note on the spectrum lines of hydrogen. The wave-lengths of twelve observed lines are found to agree with the formula $\lambda = N(m^2/m^2 - 4)$, where N is a coefficient, and m and n whole numbers. For hydrogen, $N = 3645 \times 10^{-8}$ cm.—Dr. Fr. Vogel, change of refraction in glass and calc-spar with temperature. The author finds, with Fizeau, a diminution in the difference between the two indices of calc-spar nearly proportional to the elevation of temperature.—Prof. W. Voigt, the optical properties of very thin metal films. Rediscusses Quincke's results.—Julius Elster and Hans Geitel, note on a sensitive Doubler. This is nothing else than a Thomson's water-dropper.—Elster and Geitel, remarks on the electric processes in storm-clouds. The authors regard thunder-clouds as acting as the water-dropping doubler does, in raising at the expense of the kinetic energy of the falling drops the electric potential of the mass placed under electric influence.—Elster and Geitel, on the development of electricity during formation of rain.—Dr. H. Kayser, on lightning photographs.—Prof. G. F. Fitzgerald, on the memoir of Prof. Kundt on the electromagnetic rotation of the plane of polarisation of light by iron, cobalt, and nickel.—Hanichi Muraoka, on the magic Japanese mirror.—K. Exner, remark on the velocity of light in quartz.

Rendiconti del Reale Istituto Lombardo, June 11.—Further remarks on the functions that satisfy the differential equation $\Delta^2 u = 0$, by Prof. Giulio Ascoli.—On the resolution of certain modular equations, a complement to the author's paper on the transformation and division of the elliptical functions, by G. Morera.—Inversion of the movement of the pupil in the case of a person affected by progressive analysis, by Prof. A. Raggi.—On certain physiological functions of the lower organisms: a contribution to the morphology of the Metazooi, by Prof. Leopoldo Maggi.—Reply to the recent objections advanced against a science of penal jurisprudence, by E. A. Buccellati.—Some recent studies on the origin of the Institutions of Justinian, by Prof. C. Ferrini.

THE largest space in the *Nuovo Giornale Botanico Italiano* for July is occupied by a paper by Sig. C. Massolongo, on the Hepaticæ gathered by Dr. Spegazzini in Terra del Fuego in 1882, an important contribution to Hepaticology. Ninety-five species are described, a considerable number of them new, including, also, one new genus, *Pigafettoa*. The paper is illustrated by no less than seventeen plates. The kindred Bryology claims also a paper by Sig. Venturi, on the Italian representatives of the section *Harpidium* of *Hypnum*. Sig. Piccone gives a list of marine and freshwater Algæ observed by him on or near the Ligurian coast, many of them being new to the district. The only papers in this number not concerned with Cryptogamy are teratological—by Sig. Terracciano on a quadrilocular capsule of *Agave;* and by Prof. Caruel on Viridescence in *Verbascum*.

IN the *Journal of Botany* for July, Mr. W. H. Beeby describes and figures the recently-discovered *Sparganium neglectum* from Surrey, for which he claims the rank of a good species. With the exception of a teratological note on Peloria in *Habenaria bifolia* by Mr. H. N. Ridley, all the other papers in this number are descriptive and topographical:—New ferns from Brazil, by J. G. Baker; additions to the British lichen-flora, by Rev. J. M. Crombie; Notes on the flora of Ceylon, by Dr. Trimen; on the flora of the Philippine Islands, by R. A. Rolfe; on Dovedale plants, by Rev. W. N. Purchas.—Dr. Buchanan White records one more addition to the Flowering plants of Great Britain, *Schœnus ferrugineus*, from Perthshire.

SOCIETIES AND ACADEMIES

LONDON

Geological Society, June 24.—Prof. T. G. Bonney, F.R.S., President, in the chair.—John MacDonald Cameron, Matthew Heckels, and Robert H. Williams, were elected Fellows of the Society.—The following communications were read:—Supplementary notes on the deep boring at Richmond, Surrey, by Prof. John W. Judd, F.R.S., Sec.G.S., and Collett Homersham, F.G.S. Since the author's former communication to the Society on the subject, this boring, in spite of the strenuous efforts made by the Richmond Vestry, and the contractors, Messrs. Docwra and Co., has had to be abandoned, after reaching a total depth of 1447 feet from the surface. This depth is 145 feet greater than that of any other well in the London Basin, and, reckoning from Ordnance datum, reaches a lower level by 312 feet than any other well in the district. Before the termination of the work temperature-observations were obtained, which generally confirm those previously arrived at. The strata in which the boring terminated consisted of the red and variegated sandstones and marls previously described, which were proved to the depth of 208 feet. Although it was demonstrated that these beds have a dip of about 30°, complicated in places by much false-bedding, no conclusive evidence could be obtained concerning their geological age. They may be referred either to some part of the Poikilitic series, or to the Carboniferous (for similar strata have been found intercalated in the Carboniferous series at Gayton, near Northampton), or they may be regarded as of Old Red Sandstone age. Some interesting additional observations have been made since the reading of the former paper, on the Cretaceous rocks passed through in this well. Mr. W. Hill, F.G.S., of Hitchin, has found the exact analogue of the curious conglomerated chalk met with at a depth of 704 feet at Richmond. His observations entirely confirm the conclusion that we have at this depth the "Melbourne rock" with the zone of *Belemnites plenus* in a *remanié* condition at its base. Some new facts concerning the state of preservation of the fossils in the Chalk Marl are also recorded. With respect to the conclusions arrived at by the author concerning the distribution of the Jurassic rocks on the south side of the London Basin, an important piece of confirmatory evidence has been supplied by a deep boring made at the Dockyard-Extension Works at Chatham. This section, for the details of which the authors are indebted to the officers of the Geological Survey, shows that under the Chalk and Gault, with normal characters and thickness, there lie 41 feet of sandy strata of Neocomian age, and that these are directly underlain by blue clays of Middle Oxfordian age, as is proved by the numerous fossils which they have yielded. We have now, therefore, direct evidence of the existence and position of strata of Lower, Middle, and Upper Oolite age, respectively, beneath the Cretaceous rocks of the south-east of England.—On the igneous and associated rocks of the Breidden Hills in East Montgomeryshire and West Shropshire, by W. W. Watts, F.G.S. The author, in this paper, described the succession of rocks in the small tract near the Breidden Hills situated between Welshpool and Shrewsbury. The Cambrian rocks are: (1) Criggion shales, dark and barren, much penetrated by intrusive diabases and about 2700 feet thick. (2) Andesitic lavas and ashes, followed by conglomerates of the same materials. (3) Ashy grits and shales containing *Climacograpsus antiquus? C. bicornis? C. scharenbergi, Cryptograpsus tricornis, Diplograpsus foliaceus, Leptograpsus flaccidus? Beyrichia complicata, Trinucleus concentricus, Orthis testudinaria, Bellerophon bilobatus*, The rocks are thus of Bala age, the fossils indicating that the ashy grits and shales are on the horizon of the top of the Glenkiln or bottom of the Hartfell series. These are followed by Silurian strata. (1) *Pentamerus* beds. Soft sandstones and mudstones yielding *Pentamerus globosus? P. oblongus, P. undatus, Leptæna transversalis, Strophomena rhomboidalis, Petraia subduplicata*. (2) purple shales, unfossiliferous. (3) Lower Wenlock shale, with *Monograptus vomerinus? Cryptograpsus*, sp., *M. priodon*, var. *Flemingi*. These graduate into (4) Upper Wenlock shale, with *M. priodon, M. vomerinus? M. basilicus, M. nilssoni, M. rœmeri*. (5) Lower Ludlow shale. *M. colonus, M. nilssoni, M. salweyi, M. lintwardenensis*. The paper concluded with microscopical descriptions of the igneous rocks, of which there are two sets: (1) An older set interbedded with the Cambrian and consisting of andesites bearing a large percentage of a mineral allied to enstatite, together with augite and a small quantity of hornblende and mica. These are